The Impact Of The Project Based Learning (PJBL) Model On Students' Understanding Of Science Materials In Elementary School

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ABSTRACT

The use of the Project Based Learning learning model is rooted in the challenges of the conventional learning process, which is often less effective in increasing active involvement and deep understanding of students. Traditional learning tends to focus on one-way teaching methods that emphasize memorization and understanding of the material. In this context, the Project Based Learning (PjBL) learning model emerges as an approach that focuses on providing learning experiences through projects designed to solve problems. The main factor for success in learning is the accuracy of the use of learning models. The purpose of this study was to see whether there was an effectiveness of the application of the *Project Based Learning* (PjBL) learning model in the subject of science in improving the understanding of fourth grade students of Krapyak Wetan Elementary School. This study used a *quasi-experimental research type* with research subjects of 25 students of class IV A as an experimental class using the *Project Based Learning (PjBL) learning model and 25 students of class IV B as a control class with a conventional learning model. The data collection instrument was in the form of pretest* and *posttest* question sheets . The findings of this study were an increase in understanding of the concept of science material using the *Project Based Learning* (PjBL) learning model. The data obtained were normally distributed and homogeneous. The results of the T-test using the Independent Sample *T-test* with a value of 0.000 <0.05 then Ho is rejected which indicates that there is a difference in increasing understanding of the concept of science material. The increase in understanding of the concept of science material for class IVA by utilizing the *Project Based Learning model* has been proven, with the initial measurement results of 60.8 increasing to 90.4 with an increase of 30%. So the *Project Based Learning learning model* has a significant effect and can be used as an alternative learning model for class IV students.

Keywords : *Project Based Learning; Concept Understanding; Effectiveness; IPAS*

1. INTRODUCTION

Learning activities tend to be predominantly teacher-centered or can be called conventional learning. Teachers only care about completing the material, and supporting media in the form of videos from YouTube when teaching science material. This causes many students to be: more silent when the teacher interacts or asks questions; only listen to the teacher's explanation; hesitate to ask if they do not understand the material; are accustomed to solving problems as the teacher teaches; lack of ability to process information from problems; tend to guess the answer to the problem without doing the thinking process. Some of these things have an impact on the learning process. As a result, students' abilities are below average in solving problems in science material.

To help students develop their capacity in understanding science and natural sciences material, namely by using the right learning model and choosing learning resources. With the support of the selection of learning models, learning objectives are achieved. The government has determined several good learning models to achieve objectives in classroom learning activities. Permendikbud No. 22 of 2016 includes the standard method of the 2013 Curriculum, which encourages the use of three learning models: (1)

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discovery/inquiry learning, (2) problem-based learning, and (3) project-based learning. The three learning models are thought to have an impact on students' ability to improve their understanding of science and natural sciences material. The main factor causing low learning outcomes for fourth grade students of SD N Krapyak Wetan is the lack of creativity and teacher activity in using appropriate strategies and models to teach. This results in students being less active and interested in learning which causes learning outcomes for students to be less than optimal.

Project based learning (PjBL) is a form of student-centered learning based on three principles of constructivism: learning specific material, students are actively involved in the learning process and they achieve their goals through social interaction and sharing knowledge and understanding. PjBL is included as a type of inquiry learning where the learning context is provided through authentic questions and problems in everyday life practices that lead to meaningful learning experiences (Dewi, 2022) . In *Project Based Learning* , students are required to solve problems and make important decisions to complete the given project. This can improve students' critical thinking skills in analyzing, evaluating, and creating the right solutions. With challenging and relevant learning methods, *Project Based Learning* can increase students' learning motivation. Students will be more motivated to learn because they see real results from their efforts and hard work in completing the given projects.

Previous research was conducted by "The Use of Project Based Learning (PjBL) Model Can Improve Science Learning Outcomes on Plant Body Parts Material for Grade IV Students of SD N 2 Jatinagara in the 2022/2023 Academic Year. This study found that the improvement process through the use of constructivist methods in Cycles I and II obtained four stages taken by the Teacher and Observer to obtain the expected conditions, both in activities and student learning outcomes. From the implementation of actions during the research and the results of the analysis of the data that has been obtained, that the use of the project based learning (PjBL) model can improve the abilities and learning outcomes of Grade IV students of SD N 2 Jatinagara, Jatinagara District, Ciamis Regency in learning body parts. This increase can be seen from the average value of cycle I (72.02) and cycle II (79.32).

Another study was conducted by Dika Eranda with the title " The Effect of Project Based Learning Model on Learning Outcomes in the Science Subject of Class V of Lampeuneurut Elementary School " Based on a series of studies conducted by researchers on class V students of Lampeuneurut Elementary School in improving the results of learning science on the material Chapter 4. How Our Earth Changes, the topic of Changes in Natural Factors can be concluded that there is an influence of the *Project Based Learning model* on the results of learning science in class V of Lampeuneurut Elementary School. This is evidenced by the results of the hypothesis test using the Independent Sample t-test (t-test), the results obtained were <0.001 which means <<0.05, which means Ho is rejected and Ha is accepted. With this, it shows that there is an influence of the project Based Learning model on learning outcomes in the science subject of class V of Lampeuneurut Elementary School. Likewise, its influence can be seen in the experimental class 88.33 and the control class 69.37, so that its influence can be seen in the experimental class which was given treatment in the form of the Project Based Learning model with the control class which was given treatment.

The Problem Based Learning learning model has been used to improve the ability to understand the concept of science in previous studies. This study aims to improve students' mathematical problem solving skills by using a project-based learning model that has been created and validated to involve the active role of students and facilitate the understanding of the concept of science in grade IV at SD Negeri Krapyak Wetan through a study entitled "Effectiveness of Using the Project Based Learning Model (PJBL) in Improving Understanding of Science Material in Grade IV SD Krapyak Wetan"

2. RESEARCH METHODS

This research is an experimental research with a Non-equivalent Control Group Design research pattern and a Quasi Experimental Design research design. The control group and experimental group were used to obtain data. Before applying the treatment, the researcher assessed the students' initial problem-solving abilities or pretest. The use of the Project Based Learning learning model was applied in the experimental class and the control class using a conventional learning model and one-way learning media. After the treatment, a re-measurement was carried out, namely by giving a posttest. Student learning outcomes in the form of pretests and posttests were used to determine differences in the ability to understand the concept of science. The description of the non-equivalent control group research design according to Sugiyono (2015) is:

Table 1. Research design Non-equivalent control group design

Class	Pretest	Treatment	Posttest
Experiment	P1	X	P2
Control	P3	-	P4

Information :
P1: Initial measurement (pretest) of the experimental class
P3: Initial measurement (pretest) of control class
X: Treatment using the Project Based learning model
P2: Final measurement (posttest) in the experimental class
P4: Final measurement (posttest) in the control class

This experimental study obtained data from the results of the pretest and posttest scores of both classes, namely the control class and the experimental class. The subjects used in this study were class IVA with 25 students as the control class and class IVB with 25 students as the experimental class at SD Negeri Krapyak Wetan. To obtain relevant data, the researcher went through three stages, namely:

The first stage , the researcher prepared several things, namely: (1) Observation in class during science learning at Krapyak Wetan State Elementary School; (2) Analyzing the material that will be used in the Project Based Learning learning model; (3) Compiling media validation sheet instruments, pretest and posttest sheets, lesson plans and worksheets; (4) Conducting instrument validation. **The second stage,** the researcher conducted research at Krapyak Wetan Elementary School. The second stage is divided into several stages, namely: (1) Measuring the ability to understand science concepts in the control class and experimental class; (2) Using Project Based Learning treatment for the experimental class and conventional one-way learning model in the control class to measure the ability to understand science concepts; (3) Conducting re-measurement or posttest to see the increase in the ability to understand science concepts in the control and experimental classes. The **third stage** is data processing and analysis. The data obtained by the researcher are the results of measuring problem-solving abilities, namely pretest, posttest, and learning process observation sheets. The form of pretest and posttest questions is multiple choice story questions with the same number, namely 20 questions. In processing and analyzing research data, there are several tests conducted by researchers, namely; validity test, reliability test, prerequisite test in the form of normality and homogeneity, and comparative test, namely t-test. Furthermore, understanding the concept of IPAS using the N-Gain test to compare the effectiveness of learning models.

3. RESULTS AND DISCUSSION

After all questions have been tested for validity, it is continued with a reliability test to see that the questions have met the requirements to be trusted as a data collection tool in research. Data that has a reliability test value > 0.6 has a high level of reliability and has met the data reliability requirements. The following are the results of the reliability test of the questions used in this study.

Table 2. Pre-Test Reliability Test Results

Reliability Statistics	
Cronbach's Alpha	N of Items
,946	20

Table 3. Post-Test Reliability Test Results

Reliability Statistics	
Cronbach's Alpha	N of Items
,924	20

This study conducted an analysis using the SPSS 16 program. Based on the results of the research, the reliability value of 20 items. The results of the *pre-test question analysis* were 0.946> 0.6 and the results of the *post-test question analysis* were 0.924> 0.6. Data that have a reliability test value> 0.6 have a high level of reliability and have met the data reliability requirements. Thus it can be concluded that the instrument is reliable.
The data normality test in the study was used to determine whether the data obtained based on the sample was

normally distributed or not. This study used the Kolmogorov-Smirnov test with the SPSS 16 program tool. The normality test was carried out on the pretest and posttest data obtained from the study in class IV A (Experimental Class) and IV B (Control Class) of SD N Krapyak Wetan. The following are the results of the data analysis from the written data normality test in table 5.

Table 4. Normality Test Results

No	Class Type	Test	Sig Value	Results
1	Experimental Class	*Pre-Test*	0.151	**Normal**
		Post-Test	0.174	**Normal**
2	Control Class	*Pre-Test*	0.315	**Normal**
		Post-Test	0.127	**Normal**

The hypothesis criteria are H0 $_{is}$ accepted if the significance value is >0.05. Based on the analysis table above, the significance value is >0.05 for both the pretest and posttest values in the control class and the experimental class, so H0 $_{is}$ accepted. This means that the sample is normally distributed.

Table 5. SPSS Results of Homogeneity Test

N	*a*	*Leaven Statistics*	SPSS sig value
50	0.05	1,152	0 ,288

Based on the results of the analysis that has been done from the table above, it can be seen that the number obtained in the based on mean section of Levene Statistic is 1.152 . The significance value is 0.288 . The significance value is greater than 0.05, so it can be concluded that the research sample is homogeneous.

Table 7. Results of the Post-Test T-Test for the Experimental and Control Classes

Group Statistics					
	Class	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Science Learning Outcomes	**Experimental Class**	25	90.40	6,758	1,352
	Control Class	25	73.00	9,789	1,958

Based on the output above, the mean number in the experimental class is at 90.40 while the mean number in the control class is at 73.00. It can be concluded that there is a difference in the average between the two. In this test, it can be seen that both the experimental and control classes experienced changes in the mean value. The results of the statistical calculations above on the treatment given by the researcher can be seen that there is an influence on the experiment conducted on the level of student understanding in science material using the *project based learning model* .

Creative thinking has so far received less attention in education, especially in learning in schools that still focus on the acceptance of knowledge, memory, and reasoning, with the application of the PjBL model through student style material projects, students are involved in analyzing problems, then exploring, collecting information, interpretation, and assessing projects related to the problems being studied. So that this learning allows students to develop their creativity in designing and creating projects that can be used to solve problems. Starting from these problems, the author applies the PjBL model through style material projects in science learning which is then observed for its effect on students' creative thinking skills. Based on the analysis of research data in classes IV A and IV B which are the research samples, the author describes the following discussion related to the research results.

This research was conducted at SD N Krapyak Wetan in class IV A as the experimental class and class IV B as the control class. The learning process went according to the researcher's plan. Based on the results of the research and tests processed above, the researcher can answer the existing problem formulation. The use of the

Project Based Learning (PjBL) learning model is quite effective in improving the understanding of science material in class IV of SD N Krapyak Wetan. In the learning process, students experienced a significant increase both in the experimental class and the control class, but in the experimental class students were given more attention such as being given a project assessment. This project assessment learning will make students continue to learn, because students are given demands to do assignments related to things around them.

The prerequisite results of both classes, both the experimental class and the control class, both have normal data. In the *post-test data* of the control class, the Sig. value is 0.127 > 0.05, so the *post-test data* in the control class is normally distributed. For the experimental class, the pre-test value is 0.151 > 0.05 and for *the post-test* the Sig. value is 0.174 > 0.05, so both tests in the experimental class are also normally distributed. So both the control class and the experimental class are both normally distributed. In the N Gain test in the experimental class from *the pre-test* then given treatment and at the final stage given *a post-test,* students experienced a significant increase in understanding of the science material. In the experimental class, the N Gain score had an average of 72.6 or 72.6%, so this percentage is included in the category of quite effective in implementing the *Project Based Learning* (PjBL) learning model. The minimum value in the experimental class is 50.00 % and the maximum value is 100%.

It can be concluded that there is a significant increase in the use of the Project Based Learning (PjBL) learning model in improving the understanding of science material for grade IV of SD N Krapyak Wetan. This is in accordance with previous research conducted by Surya, et al. (2020). The study proved that the Project Based Learning learning model makes students active because they are directly involved in learning so that it can improve learning outcomes (Surya, AP, Relmasira, SC, & Hardini, ATA 2018). Through project based learning, the learning that takes place is much more interesting and meaningful for students because learning is not only centered on the teacher but also involves students directly in learning activities. This can make learning more meaningful and improve students' cognitive learning outcomes (Azzahra, et al., 2023; Lailatunnahar, 2021; Yani & Taufina; 2020).

CONCLUSION

We have succeeded, based on research findings it can be stated that the *Project Based Learning learning model* is the best way to improve the understanding of the concept of science material in grade IV students of Krapyak Wetan Elementary School. Understanding the problem, preparing a solution plan, implementing the solution, reviewing and evaluating are indicators of problem solving used. This can be seen from the average posttest score of the experimental class of 90.40 and the control class with an average posttest score of 73.00. The increase in the N Gain value based on the table above shows that the average N Gain Score for the experimental class of *the Project Based Learning (PjBL)* learning model is 72.6 or 72.6% is included in the fairly effective category. With a minimum score of 50.00% and a maximum score of 100%. While the average N Gain score for the control class of 31.8% is in the ineffective category. So it can be concluded that the application of the PjBL learning model is more effective in improving the understanding of the concept of science material in grade IV of Krapyak Wetan Elementary School compared to conventional learning methods.

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